CLAIMS

I CLAIM AS MY INVENTION:

1. A braze material for diffusion brazing of an article formed of a superalloy material, the braze material comprising a carrier and filler particles comprising a size less than 100 nanometers.

2. The braze material of claim 1, further comprising the filler particles comprising a size less than 75 nanometers.

3. The braze material of claim 1, further comprising the filler particles comprising a size less than 50 nanometers.

4. The braze material of claim 1, further comprising the filler particles comprising a size less than 40 nanometers.

5. The braze material of claim 1, further comprising braze alloy particles having a melting point temperature below that of the filler particles.

6. The braze material of claim 5, wherein a weight ratio of the filler particles to the braze alloy particles is at least 70/30.

7. The braze material of claim 1, further comprising a coating of a melting point depressant material on a surface of individual filler particles.

8. The braze material of claim 1, further comprising a coating of one of the group of boron and silicon on a surface of individual filler particles.

9. The braze material of claim 1, wherein the filler particles comprise a size sufficiently small so that they exhibit a melting temperature that is less than a solution temperature of the superalloy material.

10. A diffusion brazing process utilizing the material of claim 1.

11. A process comprising:

providing a substrate material having a solution temperature;

selecting a braze material having a bulk melting temperature greater than the solution temperature of the substrate material, the braze material being in the form of particles being sufficiently small so that an incipient melting temperature of the particles is less than the solution temperature of the substrate material; and

using the braze material particles to form a braze with the substrate material.

12. The process of claim 11, further comprising forming the braze by heating the substrate material and the braze material particles together to a temperature greater than the solution temperature of the substrate material.

13. The process of claim 11, further comprising selecting the particles to have a size less than 100 nanometers.

14. The process of claim 11, further comprising selecting the particles to have a size less than 75 nanometers.

15. The process of claim 11, further comprising selecting the particles to have a size less than 50 nanometers.

16. The process of claim 11, further comprising selecting the particles to have a size less than 40 nanometers.

17. The process of claim 11, further comprising selecting the particles to have a size sufficiently small so that the particles have an incipient melting temperature at least 25 °F. below the solution temperature of the substrate material.

18. The process of claim 11, further comprising selecting the particles to have a size sufficiently small so that the particles have an incipient melting temperature at least 50 °F. below the solution temperature of the substrate material.

19. The process of claim 11, further comprising selecting the particles to have a size sufficiently small so that the particles have an incipient melting temperature at least 75 °F. below the solution temperature of the substrate material.

20. The process of claim 11, further comprising coating the particles with a melting point depressant material prior to forming the braze.

21. The process of claim 20, further comprising coating the particles with one of the group of boron and silicon.

22. The process of claim 11, further comprising:

forming the braze using a brazing heat treatment that functions as a pre-weld heat treatment; and

performing a welding process on the substrate material after forming the braze.

23. The process of claim 11, further comprising:

performing a welding process on the substrate material prior to the step of forming the braze; and

forming the braze using a brazing heat treatment that functions as a post-weld heat treatment.